North Dakota Energy Ventures
4207 Boulder Ridge Road, Suite 220
Bismarck, North Dakota 58503

November 1, 2023

North Dakota Industrial Commission
State Capital – Fourth Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Re: Project titled "NDeV Flare Gas Mitigation Demonstration Project"

To NDIC & Clean Sustainable Energy Authority Program:

North Dakota Energy Ventures (NDeV) is submitting this application for grant funding under the North Dakota Industrial Commission Clean Sustainable Energy Authority Program. This project will demonstrate a scalable solution for eliminating associated gas flares to reduce greenhouse gas and hazardous air pollution emissions while providing a pathway that monetizes the gas and ultimately pays for the mitigation equipment.

The project cost is budgeted at $30,000,000 and with this application, NDeV requests a $3,000,000 Grant for preliminary engineering and project development and a Loan in the amount of $10,000,000 to advance the project. We are confident that with this initial capital infusion, we will attract the remaining loan, grant, and investor capital to complete the project. Once the demonstration project is complete, the process will have been sufficiently de-risked to attract capital resources to scale gas processing to a level that makes a significant contribution to a cleaner environment and improves health outcomes for the public.

If you have any questions or require additional information, please do not hesitate to call our technology partner at Extiel Technologies Mr. Steve Wolf at 512 970-7506 or by email at Steve.Wolf@extiel.com.

Sincerely,

Dr. Parag Kumar
Director, North Dakota Energy Ventures, LLC

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title: NDeV Flare Gas Mitigation Project

Applicant: NDeV-Extiel, LLC

Date of Application: November 1, 2023

Amount of Request
Grant: $3 Million
Loan: $10 Million

Total Amount of Proposed Project:$30 Million

Duration of Project: 18 Months

Point of Contact (POC): Steve Wolf or
Michael O'Brien

POC Telephone: (512) 970-7506

POC Email: Steve.Wolf@extiel.com or
Michael.OBrien@extiel.com

POC Address: Extiel Technologies, Inc.
1020 East Levee St., Ste 180
Dallas, Texas 75207

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ABSTRACT

Objective:
North Dakota Energy Ventures, LLC (NDeV) is a North Dakota company founded by two prominent Bismarck medical doctors with the mission of developing technological solutions to address environmental challenges that effect the climate and the health of the citizens of ND. The robust energy sector in ND faces many challenges as it strives to reduce its impact on the environment. One such challenge is the routine flaring of Associated Petroleum Gas (APG), primarily in the Bakken.

This project demonstrates a scalable technology that will mitigate existing flare gas impacts from the release of GHG's such as CO2, SO2, NOx, and CH4 and the emission of hazardous combustion products formed inside the flare itself. These combustion products include Polycyclic Aromatic Hydrocarbons or PAHs, a class of chemicals that have a known detrimental impact on human health. It has been reported that individuals within a 60-mile radius of flaring operations have a higher degree of respiratory issues and cancer clusters have been identified downwind of flares. Eliminating these flares and diverting the APG to beneficial use will have a dramatic impact on both health outcomes and health care costs.

NDeV has partnered with Extiel Technologies, LLC, developer of a patented process that converts APG into carbon black and zero-carbon hydrogen. The process called Absolute Pyrolysis Technology (APT) consumes 100% of the flare gas with no need for CO2 sequestration and no emissions. GHG emissions and criteria air pollutants could be reduced to nearly zero and the coproduced hydrogen could create zero-carbon electricity to run the process and for export into the local grid. The produced carbon black monetizes the currently wasted APG and provides a revenue stream that will incentivize capital providers to fund the construction of future APT plants.

Each day, oil and gas operators in The State of North Dakota flare over 500 mmscf of APG (4 million MTPY) (Metric Tons Per Year) with an annual Henry Hub value of $550 million, according to a Synapse Energy Economics study. Burning this amount of gas releases nearly 10 million MTPY of CO2 into the atmosphere (equivalent to 2.2 million passenger vehicles) and an unknown quantity of PAHs and other criteria pollutants. Distributed and scalable APT units can convert this gas, at or near the wellhead, into 2.6 million MTPY of easily transported carbon black creating a revenue stream of $2.6 billion annually ***without the need for underground CO2 sequestration.*** This technology affords the State of North Dakota the opportunity to greatly reduce greenhouse gas emissions and hazardous air pollutants while monetizing a lost resource bringing more revenue to the state, resource owners, and operators while simultaneously improving human health outcomes and the environment.

NDeV-Extiel, LLC, a North Dakota Limited Liability Company, proposes to develop a $30 million flare gas mitigation project that will ultimately convert Associated Petroleum Gas (APG) into hydrogen, carbon black, and zero-carbon electricity. The same unit, operated under alternate conditions, will produce chemical grade synthesis gas (syngas), a mix of carbon monoxide and hydrogen. Syngas is the building block for a variety of industrial chemicals and transportation fuels including methanol, ammonia, urea, gasoline, Jet/Diesel, and synthetic base oils. To achieve this goal, the company will deploy Absolute Pyrolysis Technology (APT) a process developed and patented by Extiel Technologies, LLC that has

previously completed proof of concept trials on wood pellets at a near commercial scale. Applying the APT approach, coupled with other known technologies, will both reduce GHG's from flaring operations and create high value commodities that will make the project financially viable. As an outgrowth of this Pilot project, NDeV-Extiel will develop larger scale facilities that will allow the State of North Dakota to meet its goals of reducing or **eliminating** APG flaring in the state. This Pilot Project mitigates GHG emissions and criteria pollutants resulting in improved health outcomes for ND citizens **while creating new revenue streams** for resource owners, operators, and the State of North Dakota.

Expected Results:
Extiel's APT technology can process any carbonaceous feedstock in solid, liquid, or gaseous form and convert that feedstock into hydrogen and other marketable commodities. With APG as the feedstock for the APT Pilot unit, the process will create ultrapure carbon black along with zero-carbon hydrogen without the need for carbon sequestration. The carbon black will be sold into the $18 billion per year market with off takers signing contracts in advance while the produced hydrogen is used to make zero-carbon electricity meeting the power needs of the facility with some available for export to the local grid. By creating power to run the process from the produced hydrogen, the entire operation is carbon neutral. Additionally, this small Pilot project will reduce GHG emission by 5,700 MTPY. The inherent scalability of the process offers the potential to avoid millions of tons of CO2 currently discharged by APG flaring operations in the state.

Duration:
The design/development phase of the project is roughly 90 days. Construction is expected to take 15 – 18 months and, once operating, the facility may be relocated to other flare gas well sites. The Pilot Project will be the application of a single Extiel APT-500k, the development and operating side of which is detailed further in this grant application.

Total Project Cost:
Project costs are benchmarked at $30 million with $3 million for Front End Engineering & Design (FEED) and project development and $27 million earmarked for detailed design, fabrication, construction, management, land leases, operations, and related costs associated with the project. Project costs are detailed further in this application.

Participants:
NDeV-Extiel (a to be formed LLC) is a joint venture between Extiel Technologies, LLC (Extiel) and North Dakota Energy Ventures, LLC (NDeV). Extiel is a technology and project developer vertically integrated in the manufacture of high-performance specialty chemical intermediates, fuels, solvents, oils, and paraffinic waxes. Extiel has developed and patented the APT Technology to further their goals.

NDeV's is owned by Dr. Parag Kumar, a pediatric hospitalist at Sanford who has lived Bismarck for over twenty years. He has been working on pediatric health related issues for the past 15 years and most recently focused on the health of children exposed to emissions from APG flaring. Dr. Kumar is also a clinical professor of pediatrics at UND Medical School.

PROJECT DESCRIPTION

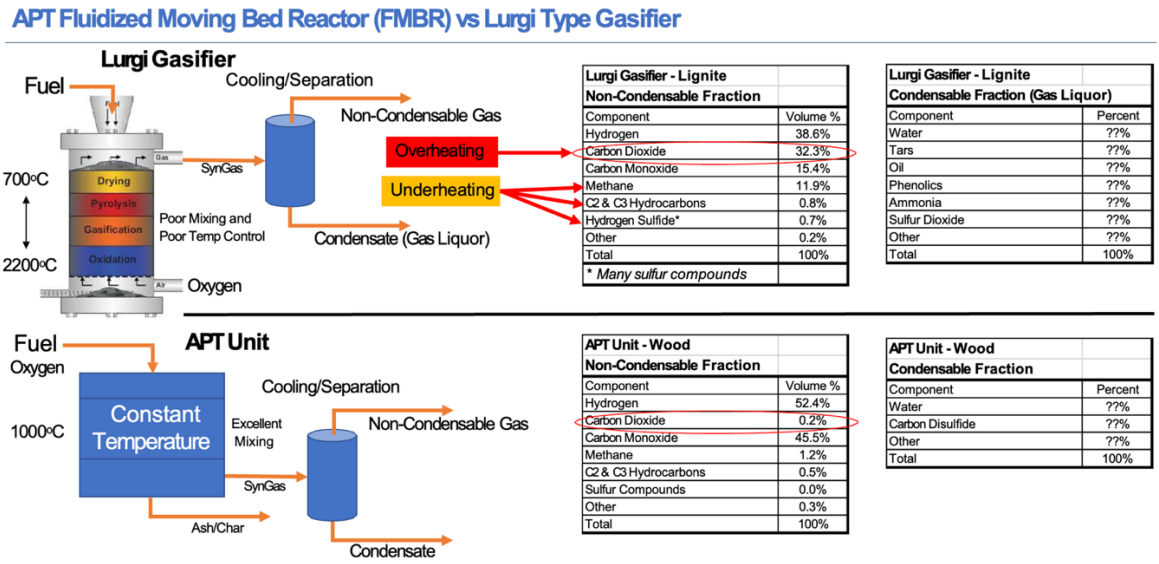
Objectives:

The objective of the NDeV-Extiel JV is to build and operate a scalable flare gas mitigation project that, when expanded, can address the flare gas issues that exist across western North Dakota. To achieve this objective, the venture will apply Extiel's patented APT technology on a small but commercial-scale APT-500k, which will process 7 to 30 MTPD (320 to 1,440 mscfd) of APG, depending on operating mode. The Pilot Project will produce sufficient hydrogen to meet the plant's operational electrical load and produce excess energy for remittance into the Grid. Ultra-pure carbon black is the main revenue generating output. Carbon black is currently used in tires, belts, hoses, inks, paint, printer toner, and numerous other applications.

Using the same technology, appropriately scaled, Extiel has developed a preliminary design for an integrated specialty chemicals plant that consumes 960 MTPD (46,000 mscfd) of APG while avoiding 814,000 MTPY CO2 emissions. Ten such units could consume essentially all APG currently flared in ND. Details and a Block Flow Diagram are provided in presentation format attached to this document.

Methodology:

Extiel's APT reactor differs from conventional pyrolysis/gasification processes (Lurgi, Plasma, or Auger) in that all feed material enters the top of the reactor and all end products exit the bottom. This ensures that all feed material is subjected to the design temperature with no underheating and no overheating. Because of this design feature, the produced gases are of higher quality with fewer impurities and downstream processing cost is greatly reduced. Below is a comparison between the Lurgi and APT process emphasizing the superior gas quality produced by the APT Unit.



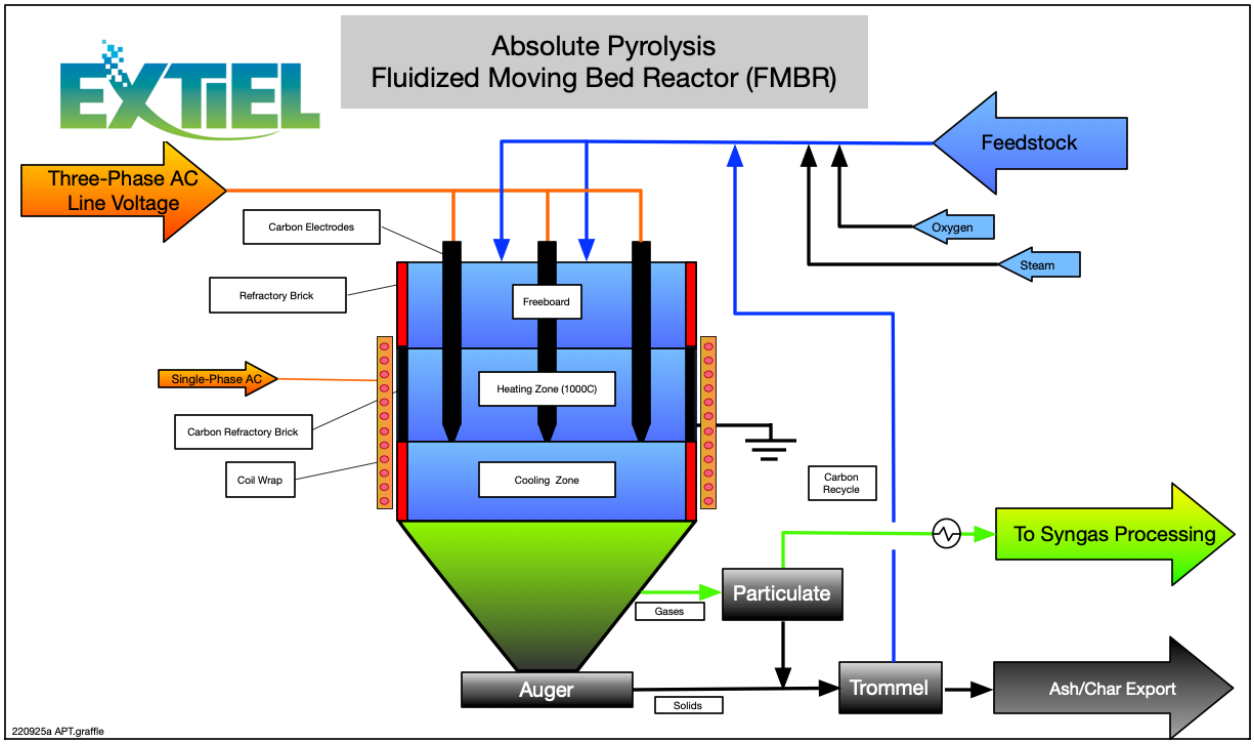
Lurgi Gasifier - Lignite Non-Condensable Fraction	
Component	Volume %
Hydrogen	38.6%
Carbon Dioxide	32.3%
Carbon Monoxide	15.4%
Methane	11.9%
C2 & C3 Hydrocarbons	0.8%
Hydrogen Sulfide*	0.7%
Other	0.2%
Total	100%
* *Many sulfur compounds*	

Lurgi Gasifier - Lignite Condensable Fraction (Gas Liquor)	
Component	Percent
Water	??%
Tars	??%
Oil	??%
Phenolics	??%
Ammonia	??%
Sulfur Dioxide	??%
Other	??%
Total	100%

APT Unit - Wood Non-Condensable Fraction	
Component	Volume %
Hydrogen	52.4%
Carbon Dioxide	0.2%
Carbon Monoxide	45.5%
Methane	1.2%
C2 & C3 Hydrocarbons	0.5%
Sulfur Compounds	0.0%
Other	0.3%
Total	100%

APT Unit - Wood Condensable Fraction	
Component	Percent
Water	??%
Carbon Disulfide	??%
Other	??%
Total	100%

Reactor temperature is precisely maintained at 1000℃ using internal electrodes and fluidization of the bed is achieved by the interacting magnetic fields produced within the reactor vessel. Finally, the bed material is constantly moving vertically through the reactor body. The result is what Extiel calls the Fluidized Moving Bed Reactor (FMBR).



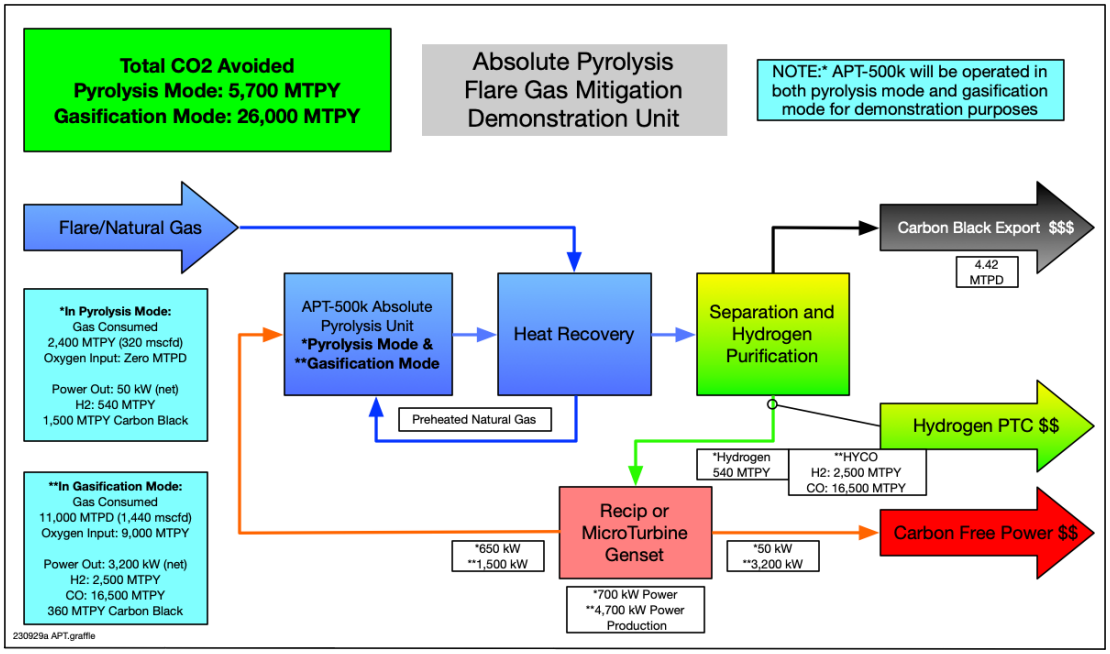
When operated on the pyrolysis mode, no oxygen is introduced, and the end products are pure carbon black and clean hydrogen. To meet commercial grade specifications (99.99% pure), the hydrogen goes through the same purification processes found in commercial hydrogen plants. If used in a combustion device such as an engine, boiler, or turbine, no further processing is needed.

The same reactor can be operated in gasification mode where pure oxygen is introduced along with the APG. In this case, carbon black is not produced, rather, methane reacts with the oxygen to produce carbon monoxide (CO) and hydrogen (H2). A subsequent commercially proven catalytic process step called Water Gas Shift (WGS), reacts CO with H2O to form additional hydrogen and sequestration-ready CO2. The Pilot Project will test the APT-500k in both pyrolysis and gasification modes.

Anticipated Results:

The Pilot Project, if operated year-round in pyrolysis mode, anticipates reducing CO2 emissions from flaring by 5,700 MTPY, ***without the need for sequestration***, while producing 1,500 MTPY of low carbon intensity (CI) carbon black and 540 MTPY of zero-carbon hydrogen. If the same APT-500k were operated in gasification mode year-round, the anticipated amount of avoided CO2 would be 26,000 MTPY. This assumes that a sequestration sink is available or that the carbon is otherwise sequestered in a commercial product such as methanol. Meanwhile, 19,000 MTPY of syngas would be produced, sufficient to feed a 200 BPD Fischer-Tropsch plant producing clean fuels, solvents, base oils,

and wax. The Pilot Project will not produce these end products but will demonstrate the ability to produce a reliable and clean syngas stream that is suitable for such a use. This is a necessary step to attract the required capital for larger projects that use any of the several commercially available downstream processes for turning syngas into ammonia, urea, methanol, fuels, etc.



From a commercial perspective, it is expected the Pilot Project will generate more than sufficient cash flow from carbon black and power sales to both repay a $6 Million loan and provide a return on an equity investment of up to $10 Million. This project is forecasted to produce sufficient cash flow to repay a $6 Million loan in 5 years.

Economics: APT-500k Flare / Natural Gas to Hydrogen, Syngas, and Carbon Black

Process	Feedstock	Production	Conversion	Offtake
APT-500k Pyrolysis Mode Zero CO2 Emissions Avoided CO2 vs Flaring: 5,700 MTPY	Power Input: 650 kW Flare Gas: 2,400 MTPY (320 mscfd)	Clean Hydrogen: H2: 540 MTPY Low CI Carbon Black: 1,500 MTPY	Hydrogen to Power: 700kW	Power (net): 50kW Carbon Black: 1,500 MTPY
APT-500k Gasification Mode Zero CO2 Emissions Avoided CO2 vs Flaring: 26,000 MTPY	Power Input: 1,500 kW Flare Gas: 11,000 MTPY (1,400 mscfd)	Clean Synthesis Gas: H2: 2,500 MTPY CO: 16,500 MTPY Low CI Carbon Black: 360 MTPY	Hydrogen to Power: 4,700 kW Syngas to Hydrogen: H2: 3,700 MTPY	Power Out: 3,200 kW (Net) Low CI Carbon Black: 360 MTPY

Source: 230928b APT Production Calculator

Key: MTPY = Metric Tons Per Year
LPM = Liters Per Minute
MW = Megawatts
mmscfd = million standard cubic ft/day

Facilities:

The heart of the Pilot Project is Extiel's patented APT-500k reactor. Many of the component parts are sourced from arc furnace designs with some important differences. APT operates at lower temperatures than an arc furnace and requires much lower voltage so that arcing does not occur. Rather, electricity passes between electrodes through a conductive bed substrate. The heat needed for dissociation of the feedstock is generated by the electrical resistance of the bed which is both fluidized and moving. In pyrolysis mode, nearly all the heat input comes from the electrical load. When operating in gasification mode, most of the required heat is provided by partial oxidation of the feed and the resulting exothermic (heat producing) reactions. This exotherm explains the much higher throughput capacity of the APT reactor in gasification mode vs pyrolysis mode.

An on-site genset consuming produced hydrogen, syngas, and/or APG will provide electrical power to operate the plant. The hydrogen/syngas conditioning train will include compressors, heat exchangers, adsorbent vessels, reactor vessels, particulate control devices, and a full suite of controls and analyzers. A small material handling section will include equipment for sizing, conveying, bagging, and loading the carbon black product for sale. A flare will be included at the facility to provide safe routing of excess produced gases and to accommodate start-up, shutdown, and emergency operations. The system will be designed for automated operation and remote viewing via PLC control. It will not, however, operate unattended.

The entire plant will be housed inside metal buildings with office, lab, and maintenance spaces to facilitate year-round operation.

Resources:

Overall project execution responsibility lies with Extiel. For the initial engineering phase that is the subject of this grant application, Extiel will call on E-Force Services, LLC, Moore Control Systems International, Inc., and EERC for engineering support. In parallel, we will identify a suitable project site and establish relationships for gas supply, site support, and logistics concerns. For these activities we have enlisted the help of Triple Curl Resources and Gap Midstream, LLC.

For later project phases we have identified fabricators, detailed engineering resources, construction support and transportation companies. These relationships will be formalized during this initial engineering phase.

Techniques to Be Used, Their Availability and Capability:

Pyrolysis and gasification (partial oxidation) have been commercially viable for hundreds of years. The original "gas light district" was so named because the streets were illuminated by gas lamps providing light to extend the hours of operation for businesses in the area. This gas was produced from coal through primitive gasification techniques resulting in dirty syngas and hazardous byproducts. Nonexistent environmental regulations meant that these pollutants effected the soil and water tables requiring remediation many years later. The purity of this "synthesized" gas was not important and the

only requirement being that it burned and sustained a flame to produce light. Today, synthesis gas can be produced in an environmentally responsible manner and must be free of impurities if it is to be used in fuel cells or any number of catalytic process applications including production of hydrogen.

This is why Extiel developed "Absolute Pyrolysis Technology" (APT). Poor gas quality and unwanted byproducts are the result of uneven temperature control and poor fixing of the feedstock. This occurs in the reactor itself. The balance of plant is comprised of off-the-shelf components that are commercially available from multiple vendors. Every pyrolysis/gasification system includes the following steps.

- Feedstock preparation – sizing, sorting, drying, pelletizing
- Material handling – conveyers, augers, hoppers, air locks
- SynGas processing – particulate separation, scrubbing, compression
- Pyrolysis reactor – application of heat (pyro) to the feed material to facilitate splitting (lysis) of the molecules

The APT plant relies on commercially available equipment for everything except the reactor. However, even the reactor design and subcomponents borrow heavily from reactors used in hundreds of electric arc furnaces (EAF) commercially operating in ore smelting and metal remelt applications. Carbon electrodes, electrode holders and retractors, refractory systems, and vessel fabrication methods, all borrowed from EAF, are directly applicable to the APT reactor. While EAFs operate at internal temperatures in the 2000 to 6000℃ range, APT operates at much less challenging temperatures, between 800 and 1200℃. EAFs typically have a tilting function to allow for dispensing of molten products. APT has no such requirement as temperatures are well below the melting point. Instead, we use common augers to extract solid carbon black, ash, and char from the bottom of the reactor. The mechanical design is much simpler than EAFs.

EAFs are highly scalable and commercially available from 1 MW to 200 MW. Our Pilot APT-500 requires 500 kw and we have plans to scale to 50 MW, well within the range of existing design/fabrication capabilities.

Our APT-500k project will be successful because 90% of the plant incorporates existing designs from experienced vendors. The final 10% will demonstrate that the quality of syngas generated by the APT reactor is significantly cleaner than any pyrolysis or gasification process on the market today. This process improvement means the gas processing train, that represents a significant portion of the capital and operating cost of current designs, will be greatly simplified.

With APT we can finally process a wide variety of sustainable and renewable feedstocks, gaseous, liquid, or solid, without the need for costly gas cleanup trains that consume chemicals and produce their own waste streams.

Using established technologies and applying them to the APT process will provide the end uses suggested. Heat recovery, separation, and hydrogen purification units, as well as combined cycle power plants (CCPP), all exist today. The capacity to run hydrogen through a gas turbine CCPP process is

provided by companies such as Siemens, GE, and Mitsubishi. Fuel cells also show promise as a method of converting hydrogen into electricity.

Environmental and Economic Impacts while Project is Underway:

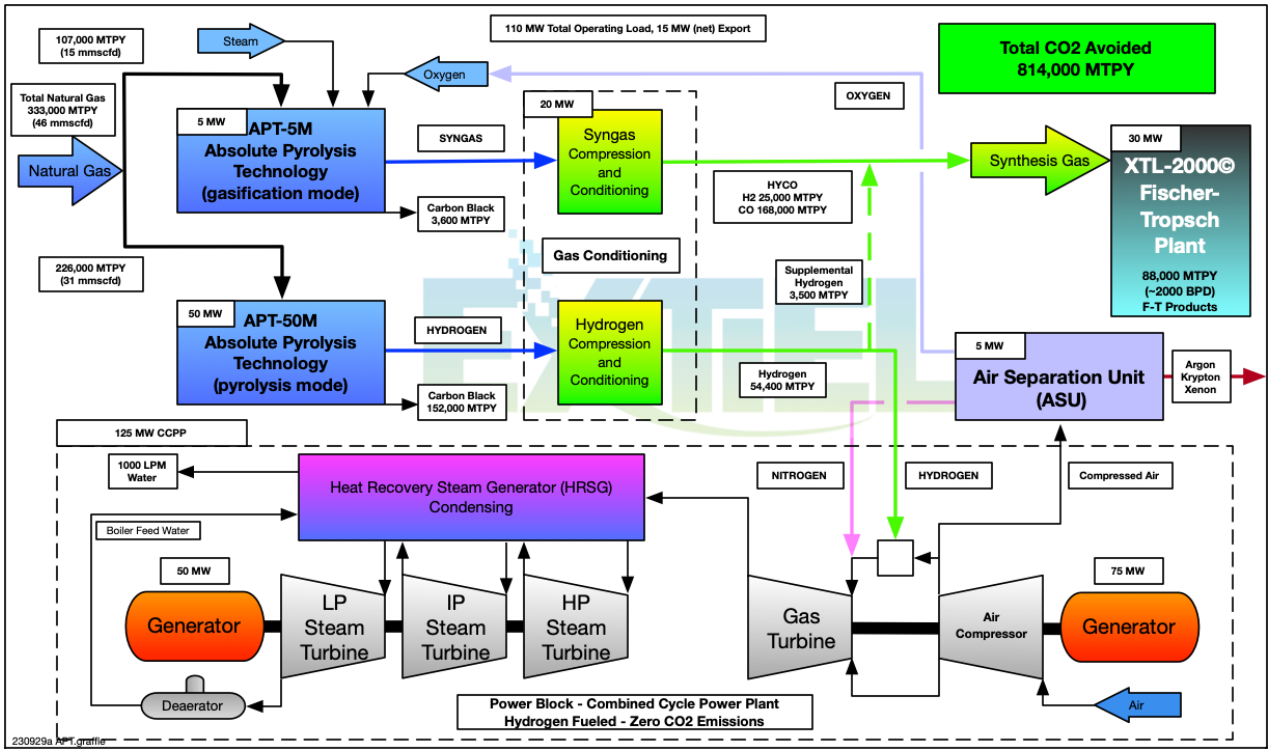
The project will utilize best industry practices for site development and construction means and methods to ensure minimal impact. From an economic perspective the project will generate several construction jobs and meet the needs of the State without putting additional pressure on the job market in The Bakken.

The project will mitigate existing flare gas impacts from the release GHG's such as CO2, SO2, NOx, and CH4 and the emission of hazardous combustion products formed inside the flare itself. Polycyclic Aromatic Hydrocarbons or PAHs have a known detrimental impact on human health. It has been reported that individuals within a 60-mile radius of flaring operations have a higher degree of respiratory issues. These health impacts have been reported in the February 2022 issue of The Journal of Public Economics. The articles author noted the cost of respiratory hospital visits in North Dakota in 2007 (in 2018 dollars) and what a nominal increase in flaring would cost. It has also been widely reported that flaring will likely increase as demand for shale oil, supported by higher prices, increases with a corresponding effect on health-related costs. Eliminating these flares and diverting the APG to beneficial use will have a dramatic impact on both health outcomes and health care costs.

Ultimate Technological and Economic Impacts:

This Pilot Project will provide North Dakota with a game changing pathway for eliminating GHG emissions and criteria air pollutants in a financially beneficial manner. The block flow diagram below outlines a system that consumes 46 mmscfd of APG and produces 2000 BPD of high value synthetic F-T products. Five such plants could essentially consume all APG currently flared in ND.

The Block Flow Diagram below illustrates the potential to use APT reactors in pyrolysis and gasification mode along with readily available gas turbine combined cycle power plants and proven Fischer-Tropsch technology to convert APT into high-value, beneficial products.



Only by reducing the technical risk of the APT reactor can we attract the capital necessary to realize these larger projects. This Pilot Project will provide the technical certainty needed to attract the capital necessary to tackle the larger APG flaring challenge.

Economics: Flare / Natural Gas to Fischer-Tropsch Liquids (solvents, lubes, waxes, fuels), carbon black

Process	Feedstock	Production	Conversion	Offtake
APT-5M + F-T Gasification Mode Zero CO2 Emissions Avoided CO2 vs Flaring: 261,000 MTPY	Power Input: 51 MW Flare Gas: 107,000 MTPY (15 mmscfd)	Clean Synthesis Gas: H2: 25,000 MTPY CO: 168,000 MTPY Low Cl Carbon Black: 3,600 MTPY	Syngas to F-T: 88,000 MTPY (~2000 BPD) Water Produced: 200 LPM	Fischer-Tropsch Liquids: 88,000 MTPY (~2000 BPD) Carbon Black: 3,600 MTPY
APT-50M + CCPP Pyrolysis Mode Zero CO2 Emissions Avoided CO2 vs Flaring: 553,000 MTPY	Power Input: 65 MW Flare Gas: 226,000 MTPY (31 mmscfd)	Clean Hydrogen: 54,400 MTPY Low Cl Carbon Black: 152,000 MTPY	Hydrogen CCPP 125 MW (gross) Water Produced: 1000 LPM	Power Out: 125-60-50= 15 MW (Net) Low Cl Carbon Black: 152,000 MTPY

Source: 230928b APT Production Calculator

Key: MTPY = Metric Tons Per Year
LPM = Liters Per Minute
MW = Megawatts
mmscfd = million standard cubic ft/day

Why the Project is Needed:

Each day, oil and gas operators in The State of North Dakota flare over 500 mmscf of APG with a Henry Hub value of $550 million per year. Burning this amount of gas releases nearly 10 million MTPY of CO2 into the atmosphere (equivalent to 2.2 million passenger vehicles). Distributed APT units can convert this gas, at or near the wellhead, into 2.6 million MTPY of easy to transport carbon black creating a revenue stream of $2.6 billion annually. CO2 emissions and criteria air pollutants could be reduced to nearly zero and the coproduced hydrogen could create zero-carbon electricity for the grid. This project affords the State of North Dakota the opportunity to greatly reduce greenhouse gas emissions and hazardous air pollutants while monetizing a now wasted resource bringing more revenue to the state, resource owners, and operators while simultaneously improving human health and the environment.

STANDARDS OF SUCCESS

The first deliverable will be Pilot of APT's ability to convert APG to carbon black. Each kg of carbon black APT produces represents 3.67 kg of avoided CO2 release. The second deliverable will be the qualitative and quantitative analysis of produced hydrogen and/or syngas. This detailed gas analysis will provide the engineering inputs required to assess its usefulness in particular applications such as combustion in a microturbine or internal combustion engine. Further, this analysis will provide an accurate basis for designing purification equipment needed to produce high purity (99.99%) compressed hydrogen for industrial applications and for use on fuel cells for transportation and power generation.

While it may seem appropriate to measure the project's effect on air quality in the immediate vicinity of the plant, we are unlikely to see much impact due to the small size of the project in comparison to

existing background pollution levels. However, point source readings at the plant will demonstrate that the process is clean and a non-contributor to GHG and criteria pollutant air emissions. This data compared to similar point source data from uncontrolled flares will demonstrate the potential positive impact of a large-scale project that mitigates a significant percentage of regional APG. This positive impact can be projected on areas like Fort Berthold, currently experiencing poor air quality related to flare gas operations and suffering the resulting health impacts.

Because the approach is scalable it can be applied near the wellhead where gathering pipelines are not practical but also at existing midstream processing centers as a method of reducing the load on these centers and downstream transmission pipelines. This can debottleneck existing gathering systems and free up capacity, reducing the need for upstream connected producers to flare their APG.

Through the project we will develop collaborative relationships with Bismarck State for job training as well as UND Fargo and work with the EERC, to both publish papers on the results as well as provide independent measured results on the progress. Finally, the project would both preserve North Dakota jobs as well as create new ones in fabrication, construction, and operations over an extended period.

Through this approach we believe the project will meet the needs of the Industrial Commission as it implements a program to further reduce the amount of flaring in the Bakken Shale Play.

BACKGROUND/QUALIFICIATIONS

Steven T. Wolf, Managing Director, Extiel Holdings, LLC

Steve Wolf is a founding member and Managing Director of Extiel Holdings, LLC, and President of Land And Natural Resource Development, Inc. (LNRD) an Alabama-based oil and gas company formed in 1987. LNRD drills and operates wells in the Paleozoics of the Black Warrior Basin in central Alabama and Mississippi, and the Cretaceous and Jurassic targets of the Salt Basin of southern Louisiana, Mississippi, Florida and Alabama. With LNRD he initiated and developed a $400 million coalbed methane project, which became a recognized field with over 500 wells. He has developed, funded, and managed the successful execution of $20-$50 million drilling and secondary recovery programs. Steve was a co-founder of Petrosakh U.S.A., which initiated development of a field on Sakhalin Island that became a 100-million-barrel field. In 2009, LNRD supervised the design, engineering, fabrication, construction, and commissioning of two gas processing plants in Kazakhstan. Early in his career he developed exploration Joint Ventures for the Eastern Exploration Region of ARCO Exploration Company. He earned a BBA in Accounting with honors and a JD Law both from the University of Texas, Austin.

Michael O'Brien, Director, Executive VP, Extiel Holdings, LLC

Michael O'Brien is a founder, Director and Executive Vice President of Extiel Holdings, LLC. Michael is also founder and President of Stranded Gas Services, Inc (SGS), formed in 2008 to develop technologies to monetize economically stranded gas that is currently capped or flared. Michael has executed hundreds of projects including fifty involving natural gas, associated gas, biogas, landfill gas, and synthesis gas streams resulting in the beneficial use of stranded resources. In 2009 through 2011, SGS participated in the project management, process design, engineering, fabrication, construction, and commissioning of two gas processing plants in Kazakhstan that recovered wasted flare gas for beneficial use. In 1995, Mr. O'Brien founded and served as President of South Coast Clean Air, Inc. (SCCA), a company dedicated to developing environmental compliance strategies for a wide variety of manufacturing processes. Michael's experience includes senior technical and business positions for GE Energy, NATCO Group, and Wheelabrator. He has authored and presented numerous technical papers at industry conferences focused on gas conditioning and environmental compliance. Michael holds a BS in Natural Gas Engineering from Texas A&M University, Kingsville, TX.

Mark Forsyth, Project Control Manager, Extiel Holdings, LLC

Mark Forsyth brings a wealth of experience in asset management, reliability, and project control. He has consulted across multiple industries on asset utilization solutions, including High Reliability Organizational (HRO) principles and Reliability and Asset Management transformation. At Chevron, Mark worked across the company's global network to drive reliability and implement best practices company wide. He managed a $3.1 billion power project for TengizChevrOil (TCO) in Kazakhstan, creating the structure for hiring, training, and certifying 700 personnel, including operating and maintenance procedures to ensure reliable and safe operation of a planned $34 Billion expansion of the TCO facilities. Mark served as Managing Director of UMS Group Sourcing Solutions, a business designed to provide outsourced process support for Asset Management, Asset Investment Strategy, Performance Management, Strategic Resource Management, Supply Chain Strategy and core Maintenance and Reliability processes. As Principal Consultant for the Asset Management Practice at UMS Group, Mark led the development of product templates, assessment guides, training programs, and information technology tools to support Strategic Asset Management. Mark graduated with honors from Excelsior College with a BS in Nuclear Engineering Technology.

Wayne Wolf – Senior Project Engineering Manager, Extiel Holdings, LLC

Wayne is a creative and solution-oriented leader who, for 30 years, has managed a wide range of projects from pilot though commercial scale in the areas of specialty water purification, GTL, hydrogen, industrial gases, biogas, and natural gas. Wayne has participated in every phase of product and project development from initial concept through design, fabrication, installation, and startup. He has directly managed or participated in the field installation of over 100 gas, water, and chemical process plants in two-dozen countries. His disciplines and capacities comprise intellectual property assessment, electrical & mechanical design, controls philosophy, reliability, serviceability, and remote monitoring/control. Previously, Wayne held CEO/CTO positions with Ozone Technology, Inc. and Omni Water Solutions, Inc. Wayne pioneered innovations in the gas phase generation of ozone (O_3) and implemented its innovative uses for water purification. Wayne is currently designing and building modular water treatment systems, complete with remote monitoring capabilities to ensure reliability, for remote communities in Africa and the Middle East that lack critical services and basic infrastructure. Wayne holds a BS in Architecture and Urban Planning from the University of Texas, Austin.

MANAGEMENT

NDeV-Extiel will form a steering committee consisting of top managers from NDeV, Extiel Technologies, E-Force Services, and GAP Midstream. The steering committee will meet monthly to review the strategic process of execution including project timeline, cost projections, regulatory approvals and other critical item highlighted by the working team.

Monthly Steering Team Meetings
Executive Review with the steering team to set objectives, evaluate progress, direct critical actions, evaluate risk, and check the project schedule.

The project execution team will draw personnel from Extiel, E-Force, Moore Control Systems International (MCSI), Gap Midstream. This group will direct the activities of the project, meeting on a weekly basis to ensure the project objectives are being met in the safest and most cost-effective manner.

Weekly Project Meetings
A kick-off meeting will be held wherein the scope, content, and logistics for the weekly meetings will be set. The purpose of the weekly meeting is to report ongoing progress to the team, anticipate required resources for the upcoming weeks and measure progress against the proposed project schedule.

The agenda will be as follows:
Safety Report
Last Week Accomplishments
Outstanding Action Items
Design Concerns
Calendar of Events
Project Schedule
Planned Field Trips
Key Milestones for the Coming Week

Weekly Reporting
The Project Manager will issue weekly progress reports describing the content of the weekly meeting. The project status will be compared to the project schedule and if deficiencies exist, the Project Manager will outline mitigating actions and resources needed to bring the project schedule back into compliance.

Proposed Project Team subject to availability.

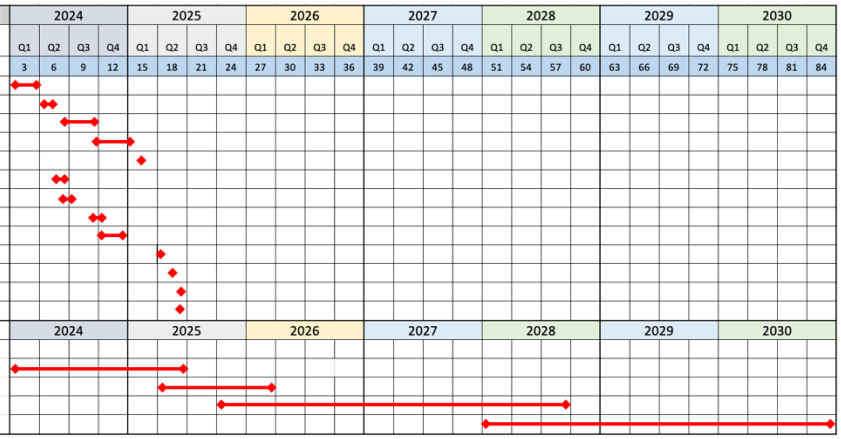
Position	Person	Company
Operations Lead	Michael O'Brien	Extiel
Project Manger	Bill Zwerneman	MCSI
Lead Technologist	Yuri Kalashnicov	E-Force
Lead Process Engineer	Paul Johnston	MCSI
Lead Project Engineer	Jared Walker	MCSI
Start-up Manager	Wayne Wolf	Extiel

TIMETABLE

The project schedule below details the proposed $30 million Pilot Project along with a timeline to achieve the larger goal of scaleup and deployment of this concept to significantly reduce or altogether eliminate the practice of flaring associated gas to produce the underlying oil.

Phase I - APT-500k Demonstration Project Schedule Detail				
		Start Month	Finish Month	Duration (Months)
#	Activity	Project Month		
1	FEED	0	3	3
2	Detailed Design	3	5	2
3	Equipment: Materials	5	9	4
4	Equipment: Fabrication	8	13	5
5	Shipping	13	14	1
6	Land Acquisition and Prep	4	6	2
7	Permitting	5	7	2
8	Site Improvements	8	10	2
9	OSBL Utilities to Site	9	12	3
10	Installation	15	16	1
11	Startup and Commissioning	16	17	1
12	Operator Training	17	18	1
13	Plant Fully Operational	17	18	0

Four Phases - Demonstration through Integrated Commercial Plants		
Phase I	APT-500k Demontraton Project	18
Phase II	APT-5M Project	12
Phase III	APT-5M, APT-50M, XTL-2000 GTL Plant	36
Phase IV	APT-5M, APT-50M, XTL-2000 GTL Plant	36



Scalable Project Phases

The outline below outlines the project phases and scalability along with the cost associated with each phase.

Project Phases: Flare / Natural Gas to Fischer-Tropsch Liquids (solvents, lubes, waxes, fuels), carbon black

Phases	Proof of Concept	APT-500k	APT-5M	APT-5M + APT-50M	APT-5M + APT-50M
Timeline	***Completed***	Q4 2024	Q4 2025	Q3 2028	Q3 2031
Land Required	None	2 acre	5 acres	150 acres	150 acres
Gas Required	Wood Pellets	0.3 to 1.2 mmscfd	3.0 mmscfd	46 mmscfd	46 mmscfd
CO2 Avoided	N/A	25,000 MTPY	55,000 MTPY	810,000 MTPY	810,000 MTPY
Products	Syngas Biochar	Hydrogen, Carbon Black, Syngas, Power	Hydrogen, Carbon Black, Power	F-T Gasoline, Diesel, JetA, Carbon Black, Power	F-T Gasoline, Diesel, JetA, Carbon Black, Power
Equipment	• Construct APT-50k • ~100kg/h feed • Operated on wood • Batch mode • Prove quality of syngas • Prove quality of biochar	• APT-500k • 1300 kW Genset • Pyrolysis Mode (310 mscd) • Gasification Mode 1,200 mscfd)	• APT-5M • Pyrolysis mode • 14 MW Genset	• APT-50M • 125 MW Power Plant • APT-5M • 2000 BPD GTL Plant (XTL-2000)	• APT-50M • 125 MW Power Plant • APT-5M • 2000 BPD GTL Plant (XTL-2000)
TIC	$12M (invested)	$30M	~$90M	~$1.6B	~$1.4B
Duration	12 months	12-18 months	12 months	36 months	36 months

BUDGET

*Please use the table below to provide an **itemized list** of the project's capital costs; direct operating costs, including salaries; and indirect costs; and an explanation of which of these costs will be supported by the financial assistance and in what amount. The budget should identify all other committed and prospective funding sources and the amount of funding from each source. **Please feel free to add columns and rows as needed.** Higher priority will be given to projects with a high degree of matching private industry investment.*

Project Associated Expense	NDIC Grant	NDIC Loan	Applicant's Share (Cash)	Other Project Sponsor's Share	Total
	3,000,000	10,000,000		17,000,000	30,000,000
Total					

The applicant is also requesting a $10 Million loan from CSEA, This will be supported with, $14.5 Million is in the form of funding from the Inflation Reduction Act Tax Credit and $2.5 is in the form of investor equity. This grant and loan request is less than 50% of total project cost.

Below is the application of funds and timeline for the process based on uninterrupted funding. Any delay in availability of funds will alter the project schedule.

		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13
Pilot Project Soft Costs														
85,000	Legal	$ 25,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
205,000	Management	$ 15,000	$ 20,000	$ 20,000	$ 20,000	$ 10,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000
35,000	Accounting	$ 3,000	$ 5,000	$ 2,000	$ 3,500		$ 10,000		$ 3,500			$ 3,000		$ 5,000
130,000	Lobbying	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
18,000	Office	$ 5,000	$ 2,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
66,000	Travel	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000
30,000	Social Media	$ 5,000	$ 1,000	$ 1,000	$ 1,000	$ 10,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 5,000	$ 1,000	$ 1,000
43,000	Grant Writing	$ 20,000	$ 3,000	$ 3,000	$ 2,500	$ 10,000	$ 2,000		$ 2,500					
114,000	Misc	$ 5,000	$ 10,000	$ 10,000	$ 10,000	$ 15,000	$ 25,000	$ 15,000	$ 2,000	$ 5,000	$ 2,000	$ 5,000	$ 5,000	$ 5,000
Pilot Project Hard Costs														
3,000,000	Engineeering	$ 750,000	$ 750,000	$ 800,000	$ 500,000	$ 75,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 20,000	$ 15,000	$ 15,000	$ 15,000
60,000	Legal	$ 25,000	$ 10,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000						
65,000	Site Lease	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
50,000	Permitting		$ 25,000	$ 25,000										
49,000	Travel		$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 4,000	$ 4,000	$ 4,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
150,000	EERC		$ 20,000		$ 20,000		$ 20,000		$ 20,000		$ 20,000	$ 20,000	$ 15,000	$ 15,000
900,000	Misc	$ 10,000	$ 25,000	$ 15,000	$ 50,000	$ 150,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 50,000	$ 50,000	$ 50,000
25,000,000	Construction (Includes 10% Contingency)			$ 500,000	$ 1,000,000	$ 2,000,000	$ 6,000,000	$ 6,000,000	$ 4,000,000	$ 4,000,000	$ 1,000,000	$ 500,000		
Totals		$ 30,000,000	$ 881,000	$ 897,000	$ 1,408,000	$ 1,639,000	$ 2,305,000	$ 6,224,000	$ 6,182,000	$ 4,190,000	$ 4,168,000	$ 1,190,000	$ 645,000	$ 133,000	$ 138,000

IRA Calculation

Eligible basis	$ 29,617,000	$ 840,000	$ 870,000	$ 1,375,000	$ 1,614,000	$ 2,264,000	$ 6,180,000	$ 6,160,000	$ 4,162,000	$ 4,146,000	$ 1,168,000	$ 616,000	$ 111,000	$ 111,000
Rate														
45%	$ 13,327,650													
50%	$ 14,808,500													
60%	$ 17,770,200													

60% ITC for facilities with either domestic content bonus OR located in an "energy" community (but not both) AND with affordable housing bonus
The project may be eligible for up to 60% if we provide power to an affordable housing community

CONFIDENTIAL INFORMATION

The contents of this application include confidential information, including the attached presentation deck.

PATENTS/RIGHTS TO TECHNICAL DATA

US Patent No: 11753591

STATE PROGRAMS AND INCENTIVES

The applicant, as well as owners and managers of the applicant have not participated in any other State of North Dakota grant or loan programs.